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Review Article

A Review Article on Anthelmintic Activity of Ethanolic Extract of Dragon Fruit Peel Powder

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ABSTRACT

The study aimed to evaluate the anthelmintic activity of ethanolic extract derived from dragon fruit (*Hylocereus undatus*) peel powder. The peels were collected, shade-dried, and subjected to Soxhlet extraction using ethanol. Preliminary phytochemical screening revealed the presence of flavonoids, tannins, alkaloids, saponins, and carbohydrates. *Pheretima posthuma*, a commonly used model organism due to its physiological similarity to human intestinal parasites, was used to assess anthelmintic efficacy. The extract was tested at concentrations of 25 mg/ml and 50 mg/ml, with albendazole serving as the standard reference drug. The extract demonstrated dose-dependent anthelmintic activity, with the 50 mg/ml concentration showing significantly reduced times for paralysis and death of the worms compared to the control and standard drug. The findings suggest that dragon fruit peel, a commonly discarded waste, possesses significant anthelmintic potential and could serve as a natural alternative or supplement to synthetic drugs.

INTRODUCTION

The word “helminth” comes from the Greek word “helminths” which means “worm”. The broad term “helminth” refers to a verity of parasitic worms that inhabit the body. Gastro- intestinal parasites are serious microorganisms in people homegrown domesticated animals, and wild creatures. Almost diseases because helminths are by and large limited to tropical locals and cause

colossal risk to well-being and add to the pervasiveness of under nourishment, eosinophilia, and pneumonia. They hurt the host by denying it food, causing blood misfortune, injury to organs, digestive or lymphatic hindrance, and emitting poisons. They are to blame for a lot of illnesses, like elephantiasis- causing lymphatic filariasis, river blindness-causing onchocerciasis, schistosomiasis, weight loss, and poor fertility.

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They are bad for your health and have pathological symptoms like diarrhoea, droopiness, emaciation and anaemia. One of the most prevalent infections worldwide, soil-transmitted helminth (STH) infections affect the poorest and most disadvantaged communities. Because they can be controlled or eradicated, these STHs are referred to as neglected tropical diseases (NTDs). However, they cause a great deal of disability and suffering. It is an infestation caused by one or more round intestinal parasites, such as whipworms, hookworms, or *Ascaris*. In endemic areas, these infections can affect the majority of the population, resulting in significant social and economic effects. Within an infected population, the prevalence of parasitic helminths typically follows a negative binomial distribution, with few individuals carrying high parasite burdens. Those individuals are most likely to fall ill and spread the disease to others in their community if they do not receive treatment. Despite being the least common, tapeworms are to blame for the worst outcomes, such as neurocysticercosis, which results in permanent brain damage and early death. Other infections like *plasmodium falciparum*, Human immunodeficiency virus (HIV), and *mycobacterium Tuberculosis* become more severe as a result of helminthiasis.

Pheretima Posthuma:

The anthelmintic activity can be performed by earthworm, due to its anatomical and physiological resemblance with the intestinal roundworm parasites of human beings. *Pheretima posthuma* worms are easily available and used as a suitable model for screening of anthelmintic drugs.

Introduction:

An earthworm is a terrestrial invertebrate that belongs to phylum Annelida. Usually have setae on all segments. Earthworm are common and very

well known to most of us. The common earthworm of our country is known as *Metaphire* sp. (*Pheretima posthuma*). It is also commonly found in Sri Lanka, Japan, Australia, South East Asia. It is represented by 13 species in the Indian soil.

Habit and Habitat:

Pheretima is a terrestrial earthworm, living in burrows made in moist. It prefers to live in burrow during daytime and at night and rainy season they come out of their shelter. It is thus nocturnal in habit. They are however, absent in regions where the soil is sandy and deficient in humus. The casting of earthworm are small rounded pellets or balls that lie at the opening of the burrow. The body wastes of earthworm increase the fertility of the soil.

Structure of Pheretima:

The body of earthworm is elongated, narrow and cylindrical measuring about 20 cm in length and 3-5 mm in width. The anterior end is more pointed than the posterior end. The dorsal side of the body is brown in colour and can be distinguished from the ventral side which is lighter in colour. The brown colour is due to the pigment porphyrin which is present in the body wall and it protects the body from bright and strong light. The soft and naked body is made up of distinct segments or metameric separated from each other by inter-segmental ring-like grooves or annuli. The body is made up of series of 100-120 similar segments. The segments 14-16 from anterior end are encased in a thick glandular tissue sheet called the clitellum. The first body segment is called peristomium (Greek: peri- around; stoma-mouth) which bears the mouth aperture on the ventral surface. The peristomium is prolonged anteriorly into a small, fleshy lobe, the prostomium (Greek: pro- anterior).



Digestive system:

Digestive of earthworm consists of alimentary canal and glands along with physiology of digestion.

1. Alimentary canal:

Alimentary canal is long and straight, extending from to anus. It consists of following parts:

- **Mouth:** 1st segment
- **Buccal cavity:** 2nd-3rd segment or middle 3rd segment
- **Pharynx:** 3rd-4th segment
- **Oesophagus:** 5th-7th segment
- **Gizzard:** 8th or 8th-9th segment
- **Stomach:** 9th or 10th-14th segment
- **Intestine:** 15th up to last segment except anus
- **Anus:** last segment

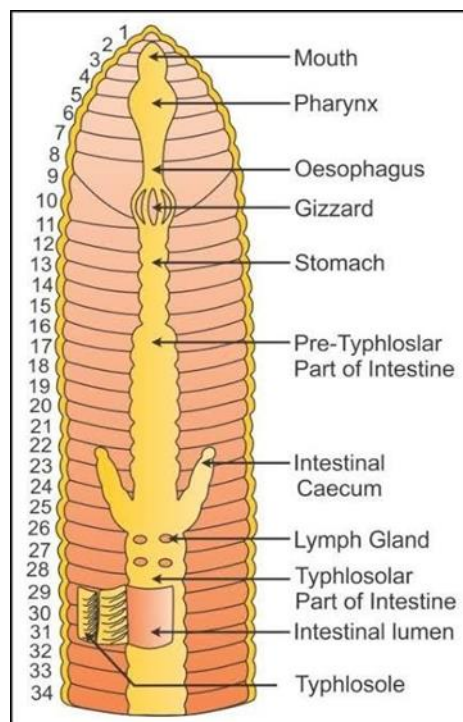


Fig 1: Alimentary Canal of Pheretima

Mouth: it is crescentic aperture situated in the 1st segment below the prostomium. Mouth leads into a buccal cavity. Ingestion of food takes place through it.

Buccal cavity: it is a short, wider, thin-walled tube extending from 2nd up to 3rd or middle of 3rd segment. It consists of two kinds of muscles. They are protractile muscle and retractile muscle. Buccal cavity protrudes out through mouth with the help of special muscle for holding the food particles during feeding. Buccal cavity leads to into spacious organ called pharynx. 3

Pharynx: it is small, swallow, wider, thick-walled pear-shaped chamber, which extended up to 4th segment. It is wider than buccal cavity. It is distinguished from buccal cavity by means of constriction. It has pharyngeal gland, located in the dorsal salivary chamber.

Oesophagus: it is narrow thin-walled tubular structure extending from 5th to 7th segment. It has no glands. It passes the food particle from pharynx into gizzard. It leads into gizzard.

Gizzard: it is oval, thin-walled and highly muscular organ lying in the 8th or 8th-9th segment.

It is the hardest part of alimentary canal due to the presence of inner lining of cuticle. It also possess chitinous teeth like projection. Its helps in grinding or crushing food so act as grinder during feeding.

Stomach: gizzard leads to short, narrow, thin-walled, highly vascular tubular structure called stomach, which extends from 9th or 10th-14th segment. It is wider than oesophagus. It has calciferous glands which helps in neutralisation of food by calcification process. Stomach leads into intestine. The glandular cell of stomach produced proteolytic enzymes for the digestion of protein.

Intestine: it is long, wide and thin-walled tube which extends from 15th to last segment except anus. Its inner lining is ciliated, vascular folded and glandular. Its intestinal lining folded to form villi. It is divided into 3 regions:

- Pre-typhlosolar region
- Typhlosolar region
- Post- Typhlosolar region

Anus: it is a circular opening in the last segment called anal segment. The undigested food material release out through anus in the form of worm casting.

Physiology of digestion:

Digestion is a bio-chemical process in which complex organic food is broken down into simple, soluble and diffusible from in the presence of respective enzyme. kinds of organic humus and

debris such as decaying leaves and seeds, Protozoan, etc... present in soil. They also feed directly on leaves, grasses and other vegetation. During feeding the buccal cavity is protrude out with help of protractile and retractile muscle. Then the food is drawn into the mouth. The ingested food enters into the pharynx through buccal cavity. The dorsal chamber of pharynx consists of pharyngeal gland which is composed of chromophil cell which produce saliva containing mucin and protease. Mucin lubricants the food of protease converts protein into amino acid. The foods then pass through oesophagus into gizzard, where grinding or crushing of food material takes place into fine state due to the contraction of circular muscle of gizzard. The grided food material enters into the stomach where the neutralization of food takes place by calcification process. Also, they occur the complete digestion of protein by proteolytic enzymes. Now the food materials enter into intestine. In intestine, intestinal caeca produce amylase which converts starch into glucose. Digestion occurs mostly in the intestine and the digested food is absorbed by villi. Then pass into blood stream through capillaries. Undigested food and the soil are released out in the form of casting through anus.

Classification Of Helminths

The definitive classification is based on the external and internal morphology of egg, larval, adult stages.



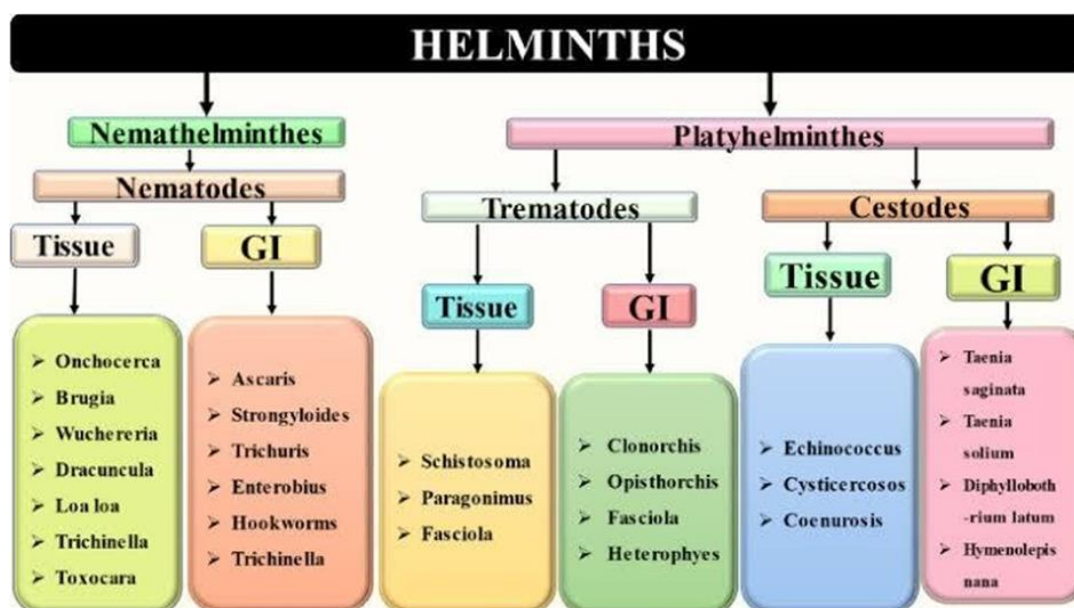


Fig. 2: Classification Of Helminths

Hookworms are known to cause chronic intestinal blood loss and can result in anaemia and chronic fatigue. Intestinal worms can cause diarrhoea, abdominal pain, and a generalised feeling of discomfort, and weakness. In some people, intestinal worms do not cause any symptoms or they may be irregular. People are infected with Ascaris and Whipworms when eggs are ingested. Hookworm eggs are not infective. About 40 million people are infected with food-born trematodes. Food -born trematodes are emerging several countries due to the globalization of the food supply, increased international travel, population growth, pollution, ecological transformation, or poverty. Infections with food-borne trematodes cause inflammatory lesions and tissue damage, which can result in serious secondary complication such as cholangiocarcinoma in the case of infections which *Clonorchis sinensis* and *Opisthorchis viverrine*. Roundworms are bisexual, cylindrical worms. They inhabit intestinal and extraintestinal sites. In contrast to Platyhelminthes, nematodes are cylindrical rather than flattened: hence the common name roundworm. The body wall is

composed of outer cuticle that has a noncellular chemically complex structure, a thin hypodermis, and musculature. The cuticle in some species has longitudinal ridges called alae. The bursa is a flap like extension of the cuticle of the posterior end.

Epidemiology

The World Health Organization (WHO) reveals that over 2 billion people, especially in developing countries, and particularly in children, are suffering from parasitic worm infections, of which ascariasis is most common. It is estimated that by the year 2025, about 57% of the population in developing countries will be influenced. Latest estimates indicate that more than 880 million children need treatment for these parasites. The population at risk in the WHO African Region is estimated at 350 million. A large part of the world's population is infected with one or more of these soil-transmitted helminths.

- Approximately 807-1,121 million with roundworm.
- Approximately 604-795 million with whipworm.

- Approximately 576-740 million with hookworm.

Etiology

Ingesting eggs or larvae causes whipworm.

Infestation can occur from consuming fruits and vegetables that have not been thoroughly washed, peeled, or cooked. Children are at the greatest risk of whipworm by putting their fingers in their mouths after playing or even eating contaminated dirt. Once swallowed, worms can produce eggs for a year or more. Poor sanitation and hygiene. Contact with contaminated faces.

Transmission & Life Cycle

They are communicated by eggs present in human dung thusly defile soil in regions where disinfection is poor. The roundworms (*Ascaris lumbricoides*), the whipworms (*Trichuris trichiura*), and the hookworm (*Necator americanus* and *Ancylostoma duodenale*) are the main species that infect people.

Hookworms:

Tainted individuals discharge helminths eggs in their dung that can sully the dirt in regions with lacking sterilization. In the soil, hookworm eggs hatch and mature into a form that can penetrate human skin. Strolling shoeless on defiled soil is the essential driver of hookworm pervasion.

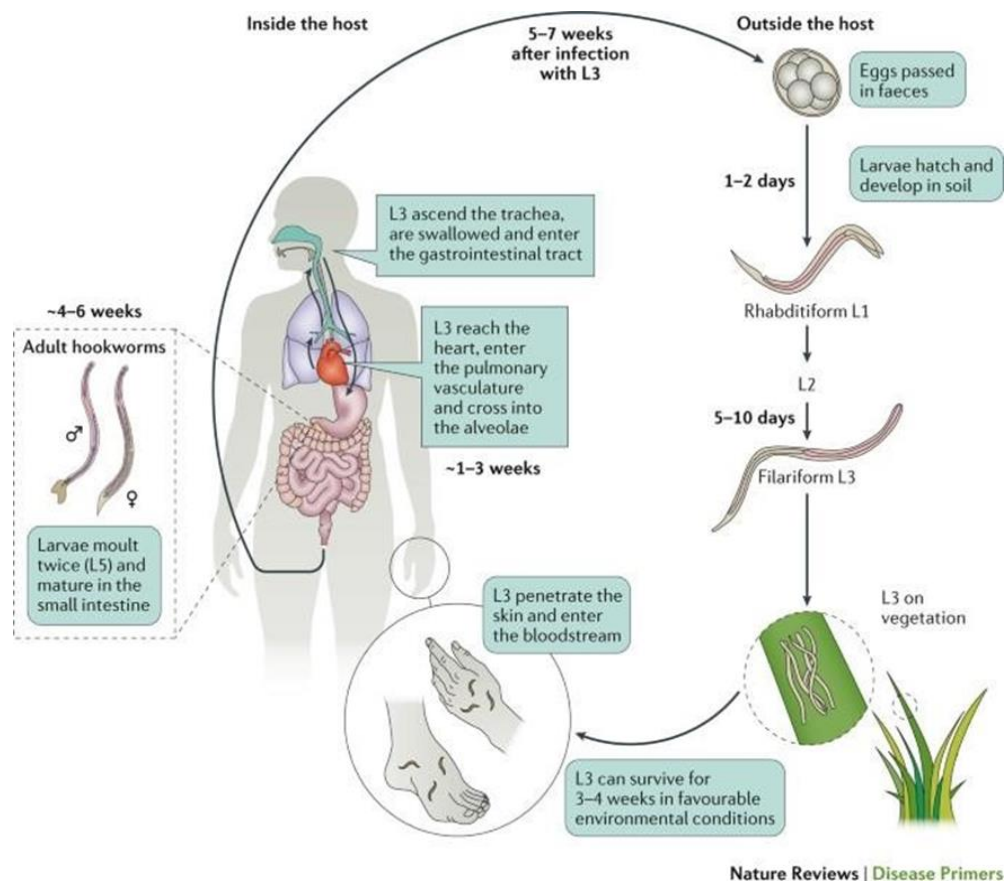


Fig 3: Life cycle of Hookworm

Whipworms:

Ingesting eggs or hatchling causes whipworm. Consuming fruits and vegetables that have not

been thoroughly washed, peeled, or cooked can result in infestation. After playing with or even eating dirt that has been contaminated, children are

most likely to contract whipworm. Worms can continue to lay eggs for up to a year after being swallowed.

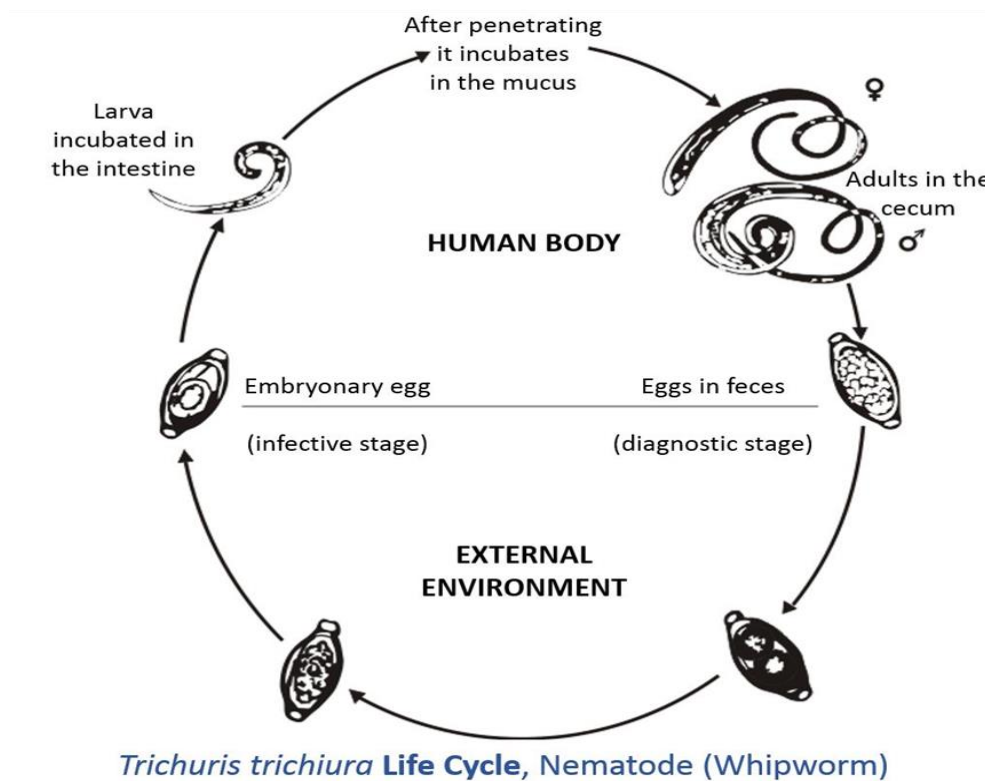


Fig 4: Life Cycle of Whipworm

Pathophysiology

Grown-up *Ascaris* hinders the digestive tract that prompts entrail block, volvulus, or intussusception, particularly in youngsters, or can attack holes prompting a ruptured appendix, cholecystitis, pancreatitis, and gastric ascariasis. *Ascaris* that migrate can also obstruct the bile duct and alter the microbiota in the intestine. Anemia is caused by mucosal bleeding from the upper gastrointestinal tract or widespread inflammation. Petechial lesions blotchy mucosal haemorrhage, oozing, and colonic inflammation are all symptoms of trichuriasis, which affects the intestinal mucosa. Pregnant women may also experience severe anaemia as a result. *Ancylostoma* and *Necator* actively suck blood by inserting their teeth into the mucosa and

submucosa, causing capillaries and arterioles to rupture and creating negative pressure by contracting their muscular oesophagus. Veins are burst by both mechanical compressions and hydrolytic catalysis emitted by these hookworms. Additionally, these worms produce anticoagulants, which cause prolonged bleeding and, in the end, significant blood loss. Together with schistosomiasis, they can increase neonatal prematurity, maternal morbidity, and mortality, as well as protein loss through inflammation, especially in children and pregnant women.

Signs And Symptoms

- Abdominal pain
- Nausea
- Loss of appetite

- Weight loss
- Cough
- Visible worms in stools (in some cases)

Hookworms:

- Skin rash on the feet where the larvae entered the body
- Fever
- Coughing or wheezing
- Abdominal pain and Loss of appetite
- Diarrhea
- Weight loss
- Anemia

Roundworms:

- Early-phase symptoms:
- High temperature(fever) of 38°C(100.4F) or above
- A dry cough
- Shortness of breath
- Wheezing
- Late-phase symptoms:
- Passing a worm in your feces
- Mild abdominal(tummy) pain
- Nausea
- Vomiting
- Diarrhea (you may also notice blood in your stool)

Whipworms:

- Bloody diarrhea
- Pain full or frequent defecation
- Abdominal pain
- Nausea
- Vomiting
- Headache
- Sudden and unexpected weight loss
- faecal incontinence, or the inability to control defecation.

Complications

A lot of complication can occur in helminths infection, which may include: □ Urinary bladder carcinoma

- Neurological complications such as seizure, myelopathy
- Primary and secondary infertility
- Ectopic pregnancy and tubal pregnancy
- Anemia
- Malnutrition
- Growth retardation
- Intestinal obstruction
- Gastrointestinal haemorrhage
- Portal hypertension
- Pancreatitis
- Blindness

Diagnosis

The most common diagnostic tests for

- Stool test
- Blood test
- Tape test
- Colonoscopy
- Imaging tests such as MRI, CT scan, X-Ray.

Treatment

Anthelmintics are drugs that might act locally to remove worms from the GIT or fundamentally to annihilate grown-up helminths or advancement shapes that attack organs and tissues. The majority of currently available anthelmintics cause side effects such as nausea, vomiting, headache and diarrhoea. The medicines that are recommended by the WHO -albendazole (400 mg) and mebendazole (500 mg) are efficient, cost effective and simple for non-medical personnel (such as teachers) to administer. They have passed numerous safety tests and have been used by millions of people with few or no adverse effects.



In all endemic nations, the WHO provides national health ministries with albendazole and mebendazole for the treatment of all school-age

children's. Ivermectin for Strongly ides stercoral is control was available in 2021 at a reasonable cost.

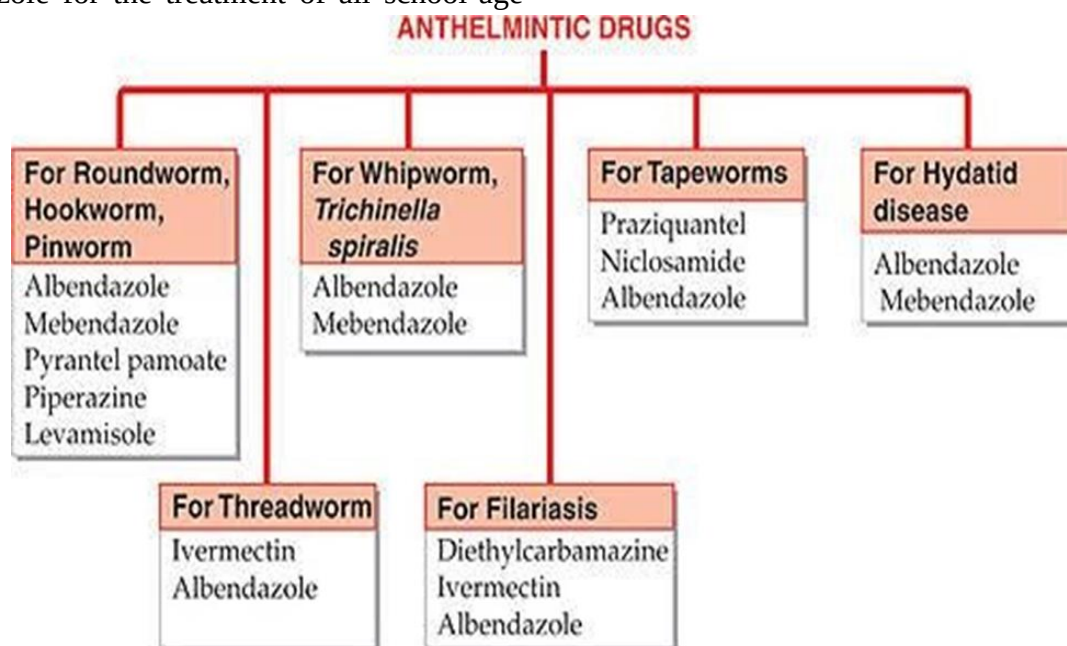


Fig 5: Anthelmintic Drugs

Standard Drug Profile

Albendazole:

Albendazole is an anthelmintic (an-the l-MIN-tik) or anti-worm medication. It prevents newly hatched insect larvae (worms) from growing or multiplying in your body. Albendazole is used to treat certain infections caused by worms such as pork tapeworm and dog tapeworm. Albendazole may also be used for purposes not listed in this medication guide.



Mechanism of action:

Albendazole causes degenerative alterations in the tegument and intestinal cells of the worm by diminishing its energy production, ultimately leading to immobilization and death of the parasite. It works by binding to the colchicine-sensitive site of tubulin, thus inhibiting its polymerization or assembly into microtubules. As cytoplasmic microtubules are critical in promoting glucose uptake in larval and adult stages of the susceptible parasites, the glycogen stores of the parasites are depleted. Degenerative changes in the endoplasmic reticulum, the mitochondria of the germinal layer, and the subsequent release of lysosomes result in decreased production of adenosine triphosphate (ATP), which is the energy required for the survival of the helminth.

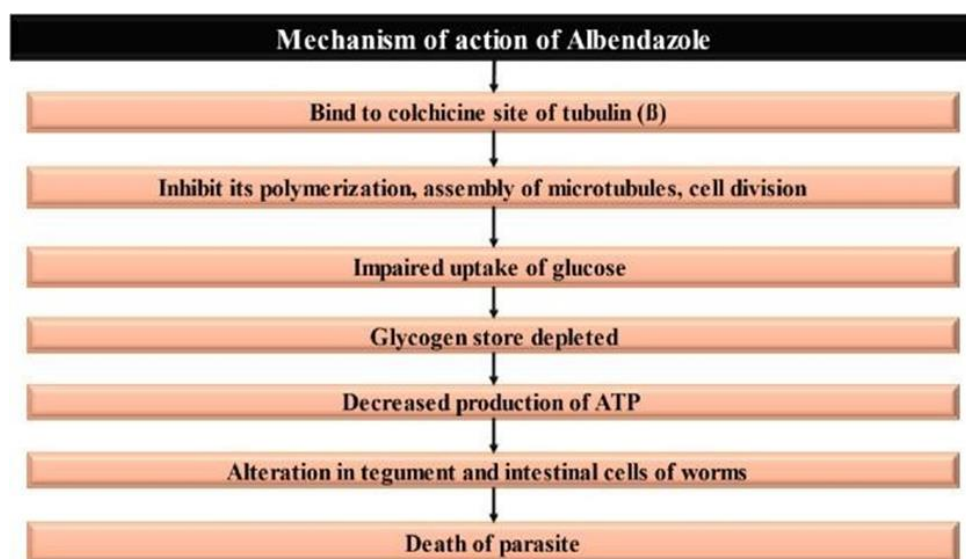


Fig 6: MOA of Albendazole

Pharmacokinetics:

Absorption: Albendazole is poorly absorbed from the GI tract; however, it is rapidly converted to its primary active metabolite, albendazole sulfoxide, prior to reaching systematic circulation. Fatty meals enhance bioavailability, as indicated by up to a 5-fold increase in plasma concentration in albendazole sulfoxide. Albendazole sulfoxide plasma concentrations are dose dependent.

Distribution: Distributed throughout the body and 70% plasma protein bound capacity.

Metabolism: Metabolised by liver. After metabolism in the liver albendazole sulfoxide, it is further metabolised to albendazole sulfone and other oxidative metabolites.

Excretion: Excreted through urine.

Half-life: 8-12 hrs.

Side Effects: Less common:

- 1.Black tarry stools
- 2.Bleeding gums
- 3.Blood in the urine or stools
- 4.Chest pain
- 5.Chills

6.Cough

7.Painful or difficult urination

8.Pinpoint res spots on the skin

9.Sore throat

Incidence not known:

- * Blistering peeling or losing of the skin
- * Blurred vision
- * Dark urine
- * Diarrhea
- * Joint or muscle pain
- * Seizures Red irritated eyes
- * Yellow eyes or skin

Clinical Uses:

- Used for the treatment of ascariasis and pinworm infections.
- And also used for the treatment of hookworm infection and trichuriasis.
- Used for hydatid disease: used as drug of choice and also adjunct to surgical removal and aspiration of cysts.
- Used in the treatment of neurocysticercos

Definition



Dragon fruit, also known as pitaya or pitahaya, is a tropical fruit that comes from several species of cactus in the *Hylocereus* and *Selenicereus* genera. It has a vibrant pink or yellow skin with green scales and a white or red fleshy interior speckled with tiny black seeds. The fruit is known for its mildly sweet taste, rich nutritional content, and health benefits, including being high in antioxidants, fibre and vitamin C.



Fig7: Dragon Fruit Plant

Synonym: Dragon fruit, Pitaya, Pitahaya, Strawberry pear.

Botanical Name: *Selenicereus Undatus*

Scientific Genus: *Hylocereus*.

Family: Cactaceae (cactus family).

Appearance: Vibrant red or yellow skin, with white, red or purple flesh speckled with tiny black seed.

Origin And Cultivathion: Native to central America and Mexico, but now cultivated worldwide.

Other Names: “Kamalam” in Gujarat, India, “Thanh long” in Vietnamese, “Buah Naga” in Malay.

Introduction

The dragon fruit, a newly introduced super fruit in India, is seen as a promising and profitable fruit crop. Fruit has a very appealing colour and mellow mouth melting pulp with black colour edible seed embedded in the pulp, as well as tremendous nutritive properties, which attracts growers from all over India to cultivate this fruit crop that originated in Mexico and Central and South America. It is a long-day plant with a lovely night-blooming flower known as "Noble Woman" or "Queen of the Night." Strawberry Pear, Dragon Seed, Pithaya, Night. Blooming Cereus, Belle of the Night, Cinderella Vine, and Jesus in the Cradle are some of the other names for the fruit.¹ Plants contain a broad range of organic molecules that do not directly contribute to the plant's growth and development. Secondary metabolites are the name for these molecules. Food additives, flavorings, pharmaceuticals, and other synthetic products have all been derived from secondary metabolites from plants.



Fig 8: Dragon Fruit

❖ Propagation:

Cuttings of the *H. undatus* are most commonly obtained by severing foot-long lateral branches at a stem segment. Making a slant cut on the end of the stem that will be inserted to improve rooting in the soil. Cutting should be cured for a minimum of 24 hours. Before planting, keep it in a cool, dry place for 5-7 days. Cutting mature stems is preferable because they are more resistant to insect and snail damage. Cuttings can be planted directly in the ground. Use a well-drained potting medium in the field or in pots.

❖ Cultivation:

Plantings at a high density of between 1100 and 1350 plants per hectare can be done commercially. It can take up to five years for a plant to reach full commercial production capacity. When can yields of 20 to 30 tonnes per hectare be expected, Hylocereus has custom-made to measure in dry conditions, as expected; 7 Tropical climates with a reasonable amount of rainfall, After flowering, the dragon fruit sets on the cactus-like trees 30–50 days later, with 5–6 harvest cycles possible every year. It is free to cultivate in various regions, It has become a weed and is classified as a cuckoo invasive weed in the United States.⁴



Fig 9: Cultivation of dragon fruit

1. Climate and Soil Requirements

- Climate: Requires temperatures between 20°C to 30°C and cannot tolerate frost.
- Soil: Well-drained, sandy or loamy soil with a pH of 5.5-7.
- Sunlight: Needs at least 6–8 hours of direct sunlight daily.

2. Propagation

Dragon fruit is propagated through seeds or stem cuttings. However, stem cuttings are preferred as they grow faster and produce fruit within 1–2 years, whereas seeds take longer.

3. Land Preparation & Planting

- Prepare raised beds or mounds to avoid waterlogging.
- Space plants 3–5 meters apart in rows.

- Use trellises or concrete poles for vertical support as dragon fruit is a climbing cactus.
- Plant cuttings 5–8 cm deep in the soil.

4. Irrigation

- Water lightly twice a week during dry periods. Avoid overwatering, as it can cause root rot.
- Reduce watering during the rainy season.

5. Fertilization

- Apply organic compost or manure at planting. Use NPK fertilizer (10:10:10) every two months to promote growth.
- Apply potassium and phosphorus when flowering begins to enhance fruit production.

6. Pollination & Flowering

- Dragon fruit flowers are nocturnal, blooming at night and often requiring hand pollination in some varieties.
- Bees and moths help in natural pollination.

7. Pest & Disease Management

- Pests: Aphids, mealybugs, and mites – control using neem oil or insecticidal soap.
- Diseases: Root rot, stem rot, and fungal infections – prevent with proper drainage and fungicides.

8. Harvesting

- Fruits are ready 30–50 days after flowering.
- Mature fruits turn red, pink, or yellow, depending on the variety.

- Harvest by gently twisting the fruit off the stem.
- A well-maintained dragon fruit plantation yields 10–30 tons per hectare annually.

❖ Types:

1. White-Fleshed Dragon Fruit (*Hylocereus undatus*)

- Skin: Bright pink with green-tipped scales
- Flesh: White with tiny black seeds
- Taste: Mildly sweet, slightly tangy

2. Red-Fleshed Dragon Fruit (*Hylocereus Caesariensis* or *Hylocereus polyrhizus*)

- Skin: Pink or reddish with green scales
- Flesh: Deep red or magenta
- Taste: Sweeter and more flavorful than the white variety

3. Yellow Dragon Fruit (*Selenicereus megalanthus*)

- Skin: Bright yellow with fewer spikes
- Flesh: White with black seeds
- Taste: The sweetest variety, with a tropical, honey-like flavor

4. Pink-Fleshed Dragon Fruit (Rare Hybrid Varieties)

- Skin: Pink or red
- Flesh: Light pink to dark pink
- Taste: A balance between the white and red varieties

❖ Taxonomical Classification:

Table:1 Taxonomical Classification

Kingdom	Plantae
Order	Caryophyllales
Family	Cactaceae
Subfamily	Cactoideae
Tribe	Hylocereae

Genus	Hylocereus
Species	H. undatus

❖ **Venavular Names:**

- English:~ Dragon fruit, Pitaya, Pitahaya
- Hindi:~ (Dragon Phal)
- Telugu:~ (Dragon Phalam)
- Tamil: ~ (Pattaya)
- Spanish: ~ Pitahaya, Fruta del dragón
- Chinese: ~ (Huǒlóng guǒ) – meaning "fire dragon fruit"
- Kannada: ~ Dragon Hannu
- Thai: ~(Kaew Mangkon) – meaning "dragon crystal"
- Vietnamese: ~Thanh long – meaning "blue dragon"
- Filipin: ~ Pitaya
- Malay/Indonesian: Buah naga – meaning "dragon fruit"

❖ **Nutrition:**

Dragon fruit is highly nutritious and offers various health benefits. Here's a breakdown of its nutritional content per 100 grams of fresh fruit:

Macronutrients:

- Calories: ~ 50–60 kcal
- Carbohydrates: ~ 11–13 g
- Sugars: ~ 7–9 g
- Fiber: ~ 3 g
- Protein: ~ –2 g
- Fats:~ 0.1–0.6 g

Vitamins and Minerals:

- Vitamin C: ~ 3–9 mg (5–15% of Daily Value) – boosts immunity and skin health
- Vitamin B1 (Thiamine): ~ 0.04 mg – supports energy metabolism

- Vitamin B2 (Riboflavin): ~ 0.04–0.05 mg – essential for growth and red blood cell production
- Vitamin B3 (Niacin): ~ 0.3–0.5 mg – helps digestion and nerve function
- Calcium: ~ 8–10 mg – important for bone health
- Iron: ~ 0.3–0.6 mg – supports oxygen transport in the blood
- Magnesium: ~ 10–12 mg – aids muscle and nerve function
- Phosphorus: ~ 24–36 mg – supports bone heal

Health Benefits:

Reduces Risk of Diabetes. Dragon fruit is known to control diabetes. ...

Reduces Risks of Cancer.

- Helps Boost Immunity.
- Improves Digestion.
- Improves Heart Health.
- Fights against Ageing Skin.
- Good for Hair.
- Healthy Bones.
- Rich fibre content.
- Low allergy potential.

❖ **Chemical Constituent:****1. Macronutrients**

- ❖ Carbohydrates (mainly glucose and fructose)
- ❖ Dietary fiber (pectin, cellulose)
- ❖ Proteins (low amounts, but includes essential amino acids)
- ❖ Lipids (mostly in seeds, rich in polyunsaturated fatty acids like linoleic acid)



- ❖ 2. Vitamins & Minerals
- ❖ Vitamin C (ascorbic acid) B-complex vitamins (B1, B2, B3)
- ❖ Vitamin E Calcium
- ❖ Magnesium Iro
- ❖ Phosphorus Potassium

❖ **Phytochemical Constituent:**

- Flavonoids – Antioxidant and anti-inflammatory properties
- Betalains – Pigments with strong antioxidant activity
- Vitamin C – Enhances immunity and skin health
- Phenolic compounds – Antioxidant and anti-cancer potential
- Polysaccharides – Prebiotic and gut health benefits
- Fatty acids (in seeds) – Omega-3 and omega-6 for cardiovascular health

❖ **Morphological Description:**

a) Plant:

A climbing, epiphytic, or sprawling cactus with fleshy, jointed, green stems. Stems have three prominent ribs with spines along the edges. Aerial roots help the plant climb and attach to surfaces.

b) Leaves: True~ leaves are absent; the modified stems (cladodes) perform photosynthesis.

c) Flowers: Large, funnel-shaped, nocturnal, and fragrant. White or yellowish in colour, blooming only at night. Pollinated by bats, moths, and bees.

d) Fruit:

- Shape: Oval to oblong, 10–15 cm long.
- Skin: Thick, leathery, bright pink, red, or yellow with soft, scale-like bracts.
- Flesh: White or red, with numerous tiny black seeds.

- Texture: Juicy, soft, and slightly grainy.
- Taste: Mildly sweet, resembling a mix of kiwi and pear.

e) Seeds:

- Small, black, and embedded in the pulp.
- Rich in essential fatty acids like omega-3 and omega-6.

2. Habitat and Distribution

Native to Central America (Mexico, Guatemala, and Costa Rica). Widely cultivated in Southeast Asia (Vietnam, Thailand, the Philippines, and Malaysia), Australia, Israel, and India. Prefers warm, tropical, and subtropical climates with well-drained soil.

❖ **Pharmacological Action Of Dragon Fruit:**

Antioxidant – Protects cells from oxidative stress

Anti-inflammatory – Reduces inflammation in chronic diseases

Antimicrobial – Effective against certain bacteria and fungi

Antidiabetic – Helps regulate blood sugar levels

Hypolipidemic – Lowers cholesterol levels

Hepatoprotective – Supports liver function

Prebiotic effects – Promotes gut microbiota balance.

• **Antimicrobial Effects**

In a study to investigate the antimicrobial effect of red pitaya peels, Temak et al. found that

the extract has efficient in vivo and in vitro effects against several microorganisms, such as *Escherichia coli* and *P. aeruginosa*. Sushmitha et al. investigated the effects of *H. undatus* seeds in



Gram-negative and Gram positive bacterial species and found that the minimum inhibitory concentration is 50 μ L for *Staphylococcus aureus* and *Escherichia coli*. et al. also found antimicrobial activity for hexane, chloroform, and ethanol extract of the skin of *H. undatus* and showed inhibition of the growth of Gram-negative and Gram-positive bacteria.

• **Anti-Cancer Effects**

Some studies have shown the anti-cancer potential of dragon fruit. Divakaran et al. aimed to

evaluate the ability of this fruit to produce nanoparticles and found they can significantly

inhibit the growth of MCF-7 breast cancer cells. Another study showed that the fecal fermentation of pitaya oligosaccharides augmented the populations of *Lactobacillus* and decreased the

populations of *Bacteroides* and *Clostridium*, and resulted in the production of lactic acid, acetic acid, propionic and butyric acids that can inhibit Caco-2 cells and has a potential for risk reduction in colon cancer.

• **Antioxidant activities.**

Exploitation of natural antioxidant substrates in medicinal plants with pre-ventive influences noncellular damage caused by free radicals, which are involved in many diseases like cancer, has been increasing (Young and Woodside 2001). us, the popularity of many plants in disease prevention could be attributed to the antioxidant (radicalscavenging) properties of their constituent phenolic compounds (such as flavonoids, phenolic acids, stilbenes, lignans and tannins), alkaloids, and vitaminic (Pietta 2000; Nyama et al. 2016; Gamet al. 2017; Pehlivan 2017; San Miguel-Chávez 2017). Several studies link the scavenging activity of antioxidant

• **Anti-Diabetic Effects:**

Many studies have demonstrated that the consumption of red pitaya can reduce glycemia in humans. In a systematic review and meta-analysis, Poolsup et al. [8] found that dragon fruit can be used to prevent diabetes. The study of Putri et al. showed that pitaya associated with metformin could significantly decrease glycemia and HOMA-IR (homeostasis model assessment-Insulin Resistance) in type 2 diabetic rats. The authors suggested that red dragon fruit could be used as an alternative to metformin due to its effectiveness in decreasing HOMA-IR (and thus, insulin resistance) and malondialdehyde levels. Moreover, the consumption of red pitaya promoted a hypoglycemic effect in dyslipidemic C57BL/6 mice, contributing to reducing the risk of insulin resistance [85]. Fadlilah and Sucipto found that pitaya (*H. polyrhizus*) effectively reduces fasting blood sugar levels in students who consume high calories daily. Marietta et al. [86] investigated the effects of red pitaya skin extract on glycemia and lipid profile of diabetic and dyslipidemic male Wistar rats and found significant reduction in glycemia.

• **Anti-anaemia activity**

Pitaya contains essential nutrients, including precursors required for erythropoiesis, such as iron (Fe), vitamins C, E, B12, thiamine, and riboflavin (Tenoret et al. 2012). Rahmawati et al. (2019) conducted a study to evaluate the effect of dragon fruit on postpartum mothers, who are considered susceptible to anaemia. Postpartum mothers were supplied with 400cc of *H. polyrhizus* fruit juice (obtained from 500g of pitaya) for 14 days. results showed that levels of haemoglobin, haematocrit, and erythrocytes increased significantly in the treatment group, compared to the control group. According to Rahmawati et al. (2019), the high content of vitamin C



in the dragon fruit is responsible for its anti-anaemia activity, as it facilitates the absorption of iron needed in the production of blood and nonheme iron.

• **Anti-Lipidemic Effects**

The use of red pitaya can improve lipid profile, decrease total cholesterol, LDL-c, and triglycerides, and increase HDL-c levels in normocholesterolemic subjects, pre-diabetic, and type 2 diabetic patients. The consumption of red pitaya also showed benefits in lipid levels in dyslipidemic C57BL/6 mice, contributing to reducing cardiovascular diseases.

❖ **Therapeutical Uses:**

Dragon fruit (pitaya) peel, often discarded, has several therapeutic uses due to its rich nutritional and bioactive compounds. Some of its key benefits include:

1. Antioxidant Properties

Dragon fruit peel is high in flavonoids, betaines, and polyphenols, which help neutralize free radicals, reducing oxidative stress and preventing cell damage.

2. Anti-Inflammatory Benefits

The peel contains compounds that may help reduce inflammation, making it useful for conditions like arthritis or inflammatory skin disorders.

3. Wound Healing & Skin Health

Due to its antimicrobial and anti-inflammatory effects, dragon fruit peel extracts can be used in homemade face masks, creams, or balms to soothe irritated skin, heal wounds, and reduce acne.

4. Diabetes Management

Studies suggest that dragon fruit peel contains dietary fiber and bioactive compounds that may help regulate blood sugar levels by improving insulin sensitivity.

5. Gut Health & Digestion

Its high fiber content supports gut health by promoting beneficial gut bacteria, improving digestion, and preventing constipation.

6. Cardiovascular Health

Dragon fruit peel may help lower cholesterol levels due to its fiber and antioxidant content, reducing the risk of heart disease.

7. Potential Cancer-Fighting Properties

Some research indicates that dragon fruit peel has anticancer properties, possibly due to its high antioxidant and polyphenol content.

How to Use Dragon Fruit Peel for Therapy?

Tea or Infusions: Dried dragon fruit peel can be brewed into a tea.

Powder Form: Dried and ground into a powder, it can be added to smoothies, soups, or baked goods.

Face Mask: Blended peel with honey or aloe vera can be applied as a skin treatment.

Fermented Drinks: Used in probiotic-rich drinks to enhance gut health.

Would you like specific recipes or DIY methods to use dragon fruit peel?

❖ **Application:**

1. Food Industry

Natural Food Colorant: The peel is rich in betacyanins, which can be used as a natural



red/purple dye in beverages, yogurts, and confectionery.

Edible Flour: Dried and ground dragon fruit peel can be added to baked goods or smoothies for added fiber and antioxidants.

Tea and Infusions: It can be dried and used to make herbal teas with antioxidant properties.

2. Health & Nutrition

Dietary Fiber Supplement: Rich in fiber, it aids digestion and supports gut health.

Antioxidant-Rich Extracts: The peel contains polyphenols and flavonoids, which can be extracted for health supplements.

Weight Management: Due to its fiber content, it helps in appetite control and digestion.

3. Cosmetics & Skincare

Face Masks & Scrubs: The antioxidants in dragon fruit peel help in skin brightening and anti-aging.

Shampoo & Hair Care: Extracts can be used to strengthen hair and promote scalp health.

4. Agricultural Uses

Organic Fertilizer & Compost: Rich in nutrients, it enhances soil quality when composted.

Animal Feed: Processed into livestock feed as a fibre-rich supplement.

5. Environmental Applications

Natural Dyes for Textiles: The pigments can be used in eco-friendly textile dyeing.

Biodegradable Packaging: Researchers are exploring dragon fruit peel for making eco-friendly food packaging.

Review Of Literature of Dragon Fruit Peel Powder

● K. N. Venkateswara Rao1

Dragon fruit (*Hylocereus polyrhizus*) or pitaya is an exotic tropical 12 Jan. 2024, plant that belongs to the family of Cactaceae. Dragon fruit is gaining Revised on 01 Feb. 2024, Accepted on 22 Feb. 2024 popularity in the market for consumption of fresh fruit due to its highly DOI: 10.20959/wjpr2024 5-31507 attractive fruit colour with nutritional and immense bioactive potential that reduces blood sugar levels, cholesterol, prevention of liver injuries, cancer, etc. It became an interesting subject for many researchers mainly due to its unique taste, shape and the flesh colour. Dragon fruit own a range of beneficial biological activities against Corresponding Author pathogenic microbes including bacteria, fungi and viruses, and diseases Dr. K. N. Venkateswara like diabetes, obesity, hyperlipidaemia and cancer. This article reports Rao about a complete data on pharmacognostic studies, traditional uses, Professor and Principal, Nutrient value phytochemistry studies, pharmacological studies till Nalanda College of date. The red variety of dragon fruit has many pharmacological uses Pharmacy, Charla ally, Nalgonda Dist., Telangana like anticancer, antioxidant, antiulcer, etc. which will be detailly State-508001.revealed.

● Nangare DD, Taware PB, Singh Y, Kumar PS

Dragon fruit (*Hylocereus* spp) is one such commercially lucrative plant with amazing health benefitting qualities along with better shelf -life can be grown in water scarcity zone, but has so far failed to draw much attention of growers in India. The suitability of this crop on rocky barren land in semi -arid region along with the shelf life and post -harvest quality of dragon fruit was evaluated at



ICAR -NIASM experimental farm . The information compiled on cultivation practices, post -harvest-management, nutritional and economic assessment will help the farmers to grow this crop in water scarcity areas and shallow basaltic terrain to improve socio-economic status of farmers.

- **N A Setiawan, R Shintawati and D Priyandoko**

The purpose of this research was to know the role of red dragon fruit peel powder to total cholesterol, triglyceride, high-density lipoprotein (HDL), low-density lipoprotein (LDL), and weight in the male hyperlipidaemic Balb-C mice (*Mus musculus*). This study used a completely randomized design (CRD) and four replicates for each dose treatments. Samples were 24 male mice that divided into six groups i.e. positive and negative controls, doses of 50;100; 150 and 200 mg/kgBW/days red dragon fruit peel powder. Before being given treatment, mice were given feed containing high fat for 20 days until experiencing conditions hyperlipidaemia. The red dragon fruit peel powder was given at oral with used gavage for 30 days. Blood samples were taken from the tail on vena caudalis. Blood lipid samples were analysed at enzymatic with BIOLABO kits. The results of this study indicate that after administration of red dragon fruit peel powder total cholesterol levels, triglycerides and LDL-C decreased, along with increasing doses of red dragon fruit peel powder for 30 days. Furthermore showed that dragon fruit powder can increase HDL-c levels. The conclusion of this research was The red dragon fruit peel powder can improve blood lipid level of male Balb-c mice hyperlipidaemia.

- **Najla lubis , Ismail D**

This study aims to determine the influence of red Dragon fruit Peel Extract (*Hylocereus Polyrrhizus*) as natural dyes and preservatives on chicken nuggets. The study uses the group Random Plan (RAK) method with 2 treatment factors. The first factor is the addition of Red Dragon fruit peel extract concentration consisting of 4 levels of treatment of 0%, 10%, 30%, and 50%. The second factor is the length of storage at 27 °C with 4 levels of treatment, i.e. 0, 12, 24 and 48 hours. The analysis parameters include moisture content, degree of acidity and saving power. The results showed that the addition of red dragon fruit peel extract concentrations at 50% treatment is the most optimal as a natural preservative because it can produce a higher shelf life of 46 hours with a water content of 34.38%. The result of chemical quality analysis of nutrients in chicken nuggets with red dragon fruit extract is the degree of acidity (pH), protein levels (% b/b), carbohydrate levels, and total fat content. The results of the protein test were conducted on samples of 13.9 (P0L0), 11.6 (P1L1), 10.7 (P2L2) and 10.0 (P3L3). Carbohydrate test Results (% b/b) are 32.0 (P0L0), 30.3 (P1L1), 28.8 (P2L2) and 28.4 (P3L3). The results of total fat content test (% b/b) are 8.04, (P0L0), 7.73 (P1L1), 7.51 (P2L2) and 6.47 (P3L3).

- **Nattaya Lourith, Mayuree
Kanlayavattanakul**

Dragon fruit is considered as a functional fruit with a decorative effect. The peel colour was evaluated on activity and stability. More preferred colour was obtained from water extract with a higher antioxidant activity and phenolic content than the ethanolic one. Chlorogenic acid, gallic acid, and quercetin were determined for the first time. Water extract having red-purple colour was stable at higher pH and temperature. Dragon fruit peel is a potential source of red-purple colour with

a moderate antioxidant activity for food and cosmetic decorations. Its ecological origin is meeting an economical perspective and the consumers' preference for green products.

- **Anusha N M, Mude Ramya Sree**

Dragon fruit, pitaya or strawberry pear (*Hylocereus* spp. and *Seleniferous* spp.) or Kamalam is emerging as a super crop worldwide. It has many advantages, because of which it has drawn much attention among Indian growers like low water and nutrient requirements, relatively less requirement of resources for establishing the orchard and maintenance, multiple harvest of fruit in a year, potential to sustain high yield up to 20 years, high benefit to cost ratio. It has now become the favourite fruit among consumers due to high nutraceuticals and functional properties (e.g., rich in antioxidants and fibres). Being a crassulacean acid metabolism (CAM) plant with xerophytes' characters, it has got potential to grow in diversified agroclimatic conditions, marginal areas and owing to its low maintenance, high profitability. In recent years the area under dragon fruit cultivation is increasing in Maharashtra, Karnataka, Andhra Pradesh, West Bengal, Telangana, Tamil Nadu, Odisha, Gujarat and the Andaman and Nicobar Islands, as well as in many north eastern states. The major challenge in dragon fruit cultivation is to standardize region specific protocols of cultivation, harvesting and post-harvest management practices for enhancing yield and quality. At present, little information is available on cultivation aspects of Dragon fruit. Research on different aspects of cultivation, global and national cultivation status and health benefits of this fruit can help to maximize the benefits to worldwide growers and consumers and to expand the market of dragon fruit.

- **Tamanna Perween, KK Mandal and MA Hasan**

Dragon fruit a recently introduced super fruit in Indian market. It is getting tremendous popularity among growers because of its attractive fruit colour and mouthwatering pulp with edible black seed imbedded inside the pulp, nutraceutical value, excellent export potential and highly remunerative in nature as produces yield from 14-16 months after planting of stem cutting and yield up to 20 years with long crop cycle from May – December in different flushes in each and every year. It is also a part of urban horticulture because of its beautiful nocturnal showy white flowers which can be used in moon garden. *Hylocereus costaricensis*, red fleshed pitaya and *H. undatus*, a white fleshed pitaya is two major species growing under Indian condition especially in West Bengal. This review deals with the knowledge regarding cultivation of dragon fruit based on literature and some of research findings in Indian condition

- **Farid Md Hussain , Shaheen Akhtar**

This review is planned to discuss the cultivation technology, nutritional values and health benefits of Dragon fruit. Dragon fruit plant has wide adaptability and grown well in slightly heavy texture soils. Plants are commonly propagated by stem cuttings. Flower buds are emerging after 15-18 months of planting and required 28-30 days for blooming. This fruit is popular due to its nutritional value, which is a good source of minerals, glucose, fructose, dietary fiber and vitamins. It strengthens the immune system of the human body and is also used in the treatment of diabetes, heart diseases and in maintaining healthy body weight. The yield and nutritional value of Dragon fruit vary depending on the species, cultivation practices, growing area and harvesting time. Dragon fruit peel has a high potential to be used as a natural dye. Numbers of commercial growers are gradually increasing in different



countries due to getting a lucrative price of their product in the markets. At present, little information is available on production aspects of Dragon fruit. Research on different aspects of cultivation and health benefits of this fruit can help to maximize the benefits to worldwide growers and consumers and to expand the market of Dragon fruit.

- **Vijaysinha Kakade , Dinesh Jinger**

Dragon fruit belongs to family Cactaceae, is a perennial semi epiphytic vine. It was initially used as ornamental plant and latter due to its health benefits and market value emerged as a new fruit crop. Owing to its rich nutrient contents and antioxidant properties, it is gaining popularity as a super fruit. The burgeoning population and the health concern people are showing interest over this fruit due to its immense medicinal properties and health benefits. It helps in the prevention of cardiovascular diseases, controlling blood sugar level thus, considered to be outstanding fruit for diabetic patient. It plays a vital role in fighting against cough, asthma, and wound healing, etc. Further, it requires very less water for growth and development due to its CAM pathway. Thus, it could be a lucrative fruit crop, particularly for degraded lands, abiotic stress and rainfed areas of the country

- **Sangeeta Lakshmeshwara**

Dragon fruit (*Hylocereus* spp.) is recently introduced amazing fruit in India, its cultivation gaining popularity because of its high nutritional value and antioxidant property. Recently, it drawn the much attention of the Indian consumers owing to its pleasant flavour, colour, with their attractive appearance, tremendous health and nutritional benefits. Dragon fruit extracts from stems, flowers, peels and pulps have beneficial biological properties against pathogenic microbes like

bacteria, fungi and viruses as well as diseases like diabetes, obesity, hyperlipidaemia and cancer. Now a days, Indian growers are much interested in its cultivation due to its promising yield, easy cultivation, great commercial potential, which increases the economical status of the farmers. The area under cultivation is insufficient to fulfill the requirement of peoples hence, there is a need to increase dragon fruit production in India. At present, a very few information is available on production aspects of dragon fruit this review papers is dealt with the knowledge regarding the botany, nutritional composition, uses, health benefits, species, cultivation aspects of dragon fruit based on recent updates of some of the research findings.

- **Thi-Thuy-Hai Luu¹, Truc-Linh Le, Nga Huynh**

Dragon fruit or pitaya is an exotic tropical plant that brings multiple benefits to human health thanks to its high nutritional value and bioactive compounds, including powerful natural antioxidants. Extracts from stems, flowers, peels, pulps of dragon fruit own a range of beneficial biological activities against pathogenic microbes including bacteria, fungi and viruses, and diseases like diabetes, obesity, hyperlipidaemia, and cancer. Moreover, dragon fruit extracts have cardiovascular and hepatoprotective properties, as well as prebiotic potential. Vietnam is a tropical country with favourable climate conditions for the development of pitaya plantations, which have great adaptability and tolerance to a wide range of environmental conditions (e.g. salinity adaptation, favour light intensity, drought resistance, etc.). The dragon fruit, thanks to its nutritional properties, biological activities, and commercial value has become a cost-effective product for the Vietnamese economy, particularly in the poorest areas of the Mekong Delta region, and a driving force in the sustainable development of Vietnam



under the challenges posed by the global climate change such as saline intrusion and drought.

- **Pratap Madane, Arun K Das**

In this study, the efficacy of dragon fruit peel (DFP) powder as antioxidant dietary fibre (ADF), at two different concentrations (T1-1.5% and T2-3.0%), on quality improvement and susceptibility to lipid oxidation of chicken nuggets during 20 days of refrigerated storage was assessed. DFP, rich in dietary fibre (56.91%) with higher insoluble dietary fibre, phenolics (36–39 mgGAE/100 g) content and possessing good radical scavenging activity as well as reducing power, contained 10.36% protein, 4.48% fat and 2.34% ash. HPLC analysis revealed presence of high concentrations of gallic and ferulic acid, among the phenolics. Incorporation of DFP in nuggets although decreased the pH but improved emulsion stability as well as cooking yield and had higher protein, ash and lower fat content. Further, the treated nuggets had significantly ($p < 0.05$) higher dietary fibre and total phenolics content than control. Incorporation of DFP decreased the hardness, gumminess and chewiness and improved ($p < 0.05$) the products' redness values. Sensory evaluation of the products revealed significant improvement in the appearance score and non-significant ($p > 0.05$) increase in the scores of other attributes compared to control samples. DFP significantly decreased lipid peroxidation, odour

scores and microbial load in chicken nuggets during 20 days of storage period. From the study, it could be deduced that DFP rich in bioactive components had positive influence on the nutritional quality of chicken nuggets and could also be used as ADF in muscle food without affecting the quality and acceptability of products.

Aim And Objectives

Aim:

The present study aim is to evaluate the anti-helminthic activity of the ethanolic extract of Dragon fruit peel powder by using Soxhlet apparatus.

Objectives:

- Collection of dragon fruit peel powder.
- Extraction process by using soxhlet apparatus.
- Preliminary phytochemical screening.
- Collection of earthworms.
- Anti-helminthic activity.

MATERIALS AND METHOD

Collection Of Dragon Fruit Peel Powder:

The dragon fruit were collected from the local market. The peel was collected were dried under the sunlight for 12 day and pulverised to a coarse powder using a motor pestle.



Fig 10: Dragon fruit peel



Fig 11: Dragon fruit peel powder

Preparation Of Extract

Extraction Process by Using Soxhlet Apparatus:

For extraction process, we take about 80 gms of dragon fruit peel powder



Was soaked in 600 ml of ethanol



It can be left for 7 days at set up Soxhlet apparatus by the ethanolic extraction



Then it was filter by using whatman No 1 filter paper conical flask



The filtrate was collected and the solvent was heated to evaporated in a heating mantle at 60 c



The crude extract was collected and stored in a sterile contain until its use preliminary phytochemical screening



The plant extract was assessed for the existence of the phytochemical analysis by using the following standards method

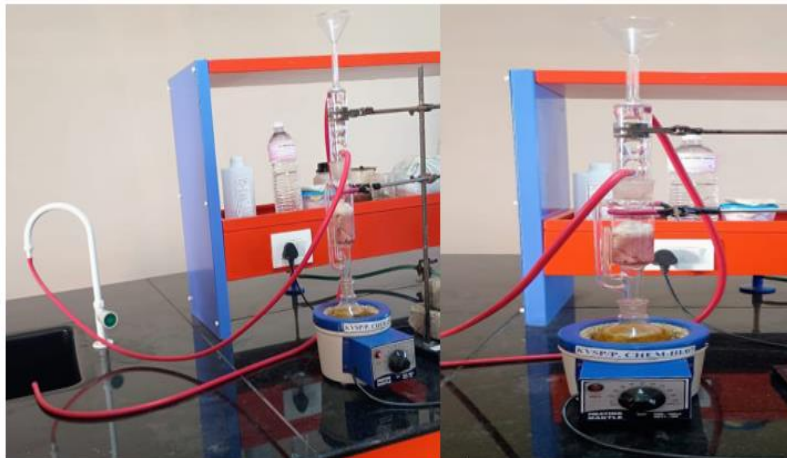


Fig12: Extraction Process in Soxhlet Apparatus



Fig 13: Filtration of extract



Fig14: Extract

❖ Preliminary Phytochemical Screening:

The plant extract was assessed for the existence of the phytochemical analysis by using the following standard methods.

Test for flavonoids:

- **Shinoda test:**

Take some amount of test solution (Alcoholic extract of drug) + Few magnesium turnings + concentrated HCL (Hydrochloric acid) drop wise. Appearance of pink, crimson red colour.

Presence of flavonoids.

- **Sulphuric acid test:**

Test solution + sulphuric acid (60% or 80%). The appearance of red or red bluish colour. Presence of flavonoids.

- **Lead acetate test:**

Test solution + lead acetate solution. Appearance yellow precipitate. Presence of flavonoids.

- **Alkaline reagent test:**

Test solution + few drops of sodium hydroxide solution (NaOH). Appearance intense yellow colour from turns to colourless. Presence of flavonoids.

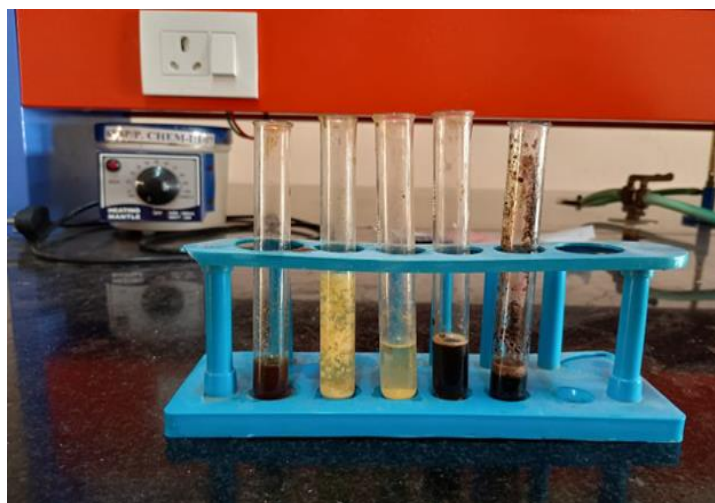


Fig 15: Teste For Flavonoids

Test for alkaloids:

- **Mayers test:**

Test solution + few drops of mayers reagent (potassium mercuric iodide). formation of creamy -white precipitate. Presence of alkaloids.



- **Dragon draff test:**

Drug solution + dragon drofts reagent (potassium bismuth iodide) formation of orangish red colour. Presence of alkaloids.

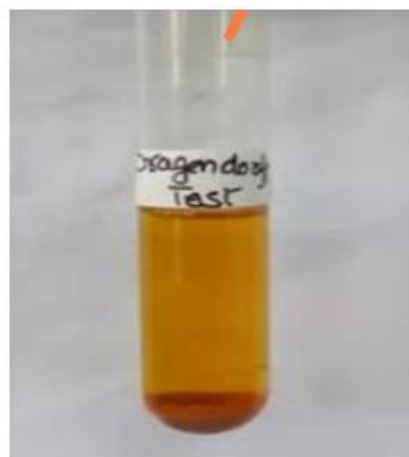


Fig 16: Teste for alkaloids

Test for Tannins:

- **Ferric chloride test:**

Dissolving the sample in water or ethanol, then and a few drops of ferric chloride (FeCl_3) solution. appearance a blue-black or green-black colour change indicates the presence of tannins.

Test for saponins:

5 ml of distilled water was mixed with extract in a test tube and it was mixed vigorously. The frothing was mixed with a few drops of olive oil and mixed vigorously and the foam appearance showed the presence of saponins.

Test for Carbohydrates:

Molisch's test: 2ml of extract taken in a test tube. Now 10 drops of molisch's reagent are added to the extract and mix it. Now, add slowly concentrated sulphuric acid in sloping the test tube by its slide without mixing vigorously. A purple ring appears

at the interface between the acid and test layers which confirms the presence of carbohydrates.

❖ Collection Of Earthworms:

The Indian earthworms *Pheretima posthuma* were collected from a vermicompost unit at Chinna Tekur village near Kurnool, Andhra Pradesh.



Fig 17: Collection Of Earthworms

❖ Anthelmintic Activity:

Preparation of plant extract: The extract was dissolved in 25 ml of distilled water to prepare test solutions of concentrations of 25mg/ml, 50mg/ml, to be used for screening the anthelmintic activity.

Standard drug: 1.5 gms of albendazole was dissolved in 25 ml of distilled water and take different concentrations like 25 mg/ml, 50mg/ml,

Activity:

The anthelmintic activity was evaluated on adult Indian earthworms (*Pheretima posthuma*). Preliminary evaluation of anthelmintic activity test samples of the extract was prepared at the concentrations of 25mg/ml, 50mg/ml, 30 worms of 5-7 cm were divided into 7 groups (control, 1 test solutions, 2 standard solutions) each containing 4 worms, and placed in Petri dishes containing above test solutions of extract.

Albendazole was used as the reference standard drug at the concentrations of 25 mg/ml, 50mg/ml, and distilled water is used as a control. All the tests, control, and standard solutions were prepared freshly before starting the experiment. Observation is made for the time taken for paralysis when movement was lost or no movement. The time for the death of worms was record.

RESULTS

❖ **Collection & Identification of Drug:** The peel of dragon fruit belongs to family- Cactaceae (cactus family) were selected from the study. The plant material peel was collected from local market Kurnool District and authenticated by K. Vanitha kumari head of the department of botany in St Joseph degree college Kurnool.

❖ Colour, Nature and Percentage Yield of Extract:

Table:2 Colour, Nature and Percentage Yield of Extract

Name of the plant	Wt. Of the powered seeds	Extracts	Colour	Consistency	Yield	
					Wt.(gms)	%
Dragon fruit (Hylocereus undatus)	80gms	Ethanollic	Brownish colour	Semisolid & sticky	2.5gms	1.50

❖ Phytochemical Screening:

Table:3 Qualitative chemical examination of extract of Dragon fruit peel powder.

Name of the phytoconstituents	Ethanollic Extract
Flavonoids	+
Tannins	+
Alkaloids	+
Saponins	+
Carbohydrates	+

presence of flavonoids, tannins, alkaloids saponins and carbohydrates.

❖ Anthelmintic Activity

For monitoring anthelmintic activity different concentrations of ethanolic extract (25mg/ml, 50mg/ml) were taken. While normal saline and albendazole (25mg/ml, 50mg/ml) act as control and standard drug respectively. Time of paralysis and death was observed.

Preliminary phytochemical screening of the ethanolic extract of Dragon fruit peel powder reveals the

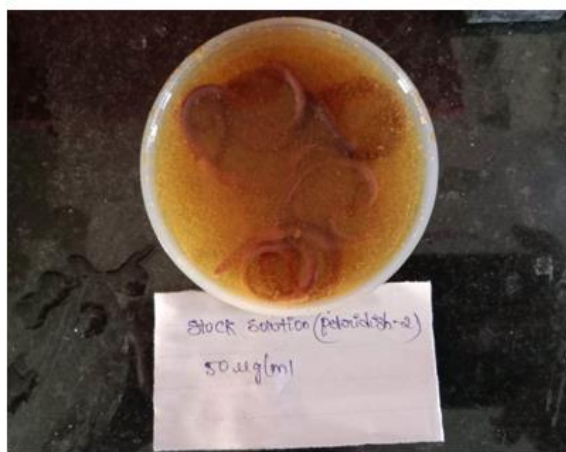


Fig18: Anti-Helminthic Activity of Ethanolic Extract of Dragon Fruit Peel Powder with Different Concentrations.

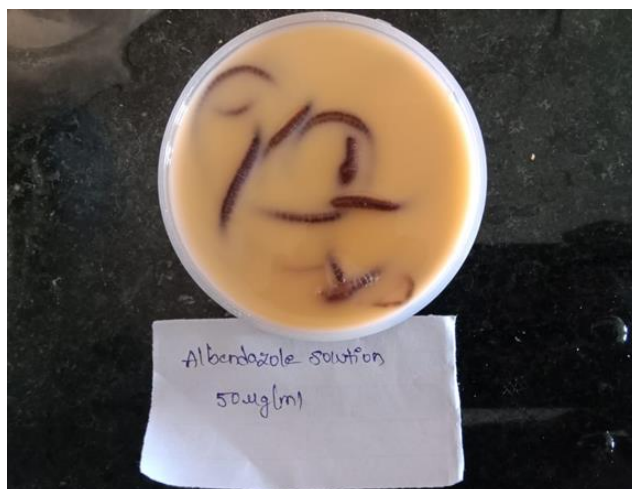


Fig19: Antihelminthic activity of standard drug with Albendazole tablet

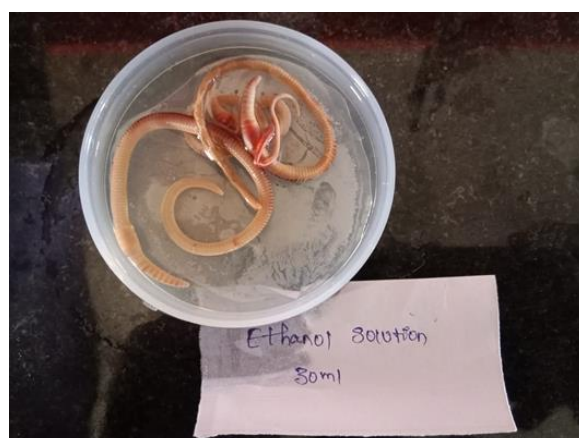


Fig20: Antihelminthic activity of Ethanol

**Different concentrations of ethanolic extract,
standard drug Albendazole tablet and Ethanol**

Table:4 Anthelmintic activity of test (extract of dragon fruit peel powder)

S. No	Concentrations	Time Of Paralysis (Min)	Time Of Death (Min)
1.	25 mg/ml	24	1 hour 18 mins
2.	50 mg/ml	12	1 hour 21 min

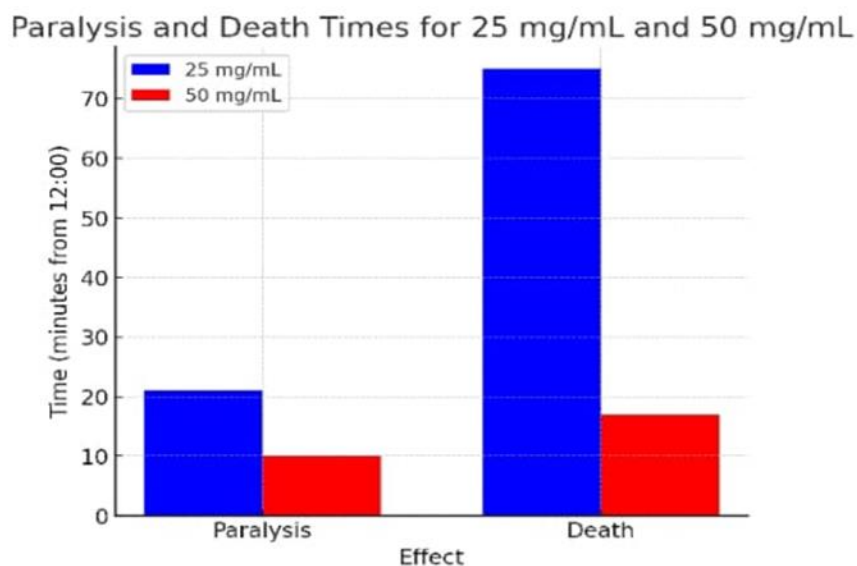


Fig 21: Anthelmintic Activity Of (Extract in Dragon Fruit Peel Powder)

Table:5 Anthelmintic activity of standard Drug (Albendazole)

S. No	Concentrations	Time Of Paralysis (Min)	Time Of Death (Min)
1	50 mg/ml	14	1 Hour 33 Mins

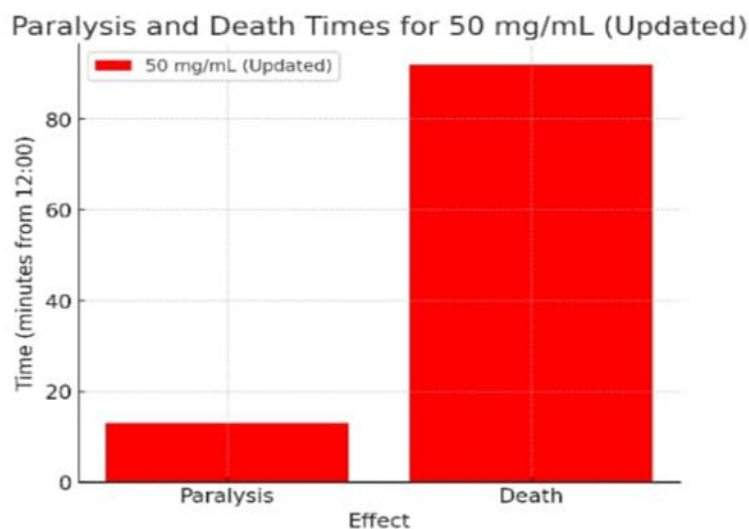


Fig 22: (Anthelmintic activity of standard Dug Albendazole)

❖ DISCUSSION

Dragon fruit peel powder were collected from nearby market to prove the anthelmintic activity of ethanolic extract of Dragon fruit peel powder. The peels were collected, dried, pulverised in motor pestle into a coarse powder, and extracted by

Extraction process with soxhlet apparatus solvent. The extract was screened for phytochemicals. The screening shows the presence of flavonoids, saponin, tannins, alkaloids, and carbohydrate. The anthelmintic activity can be performed by earthworm, due to its anatomical and physiological resemblance with the intestinal

roundworm parasites of human beings. Pheretima postuma worms are easily available and used as a suitable model for screening of anthelmintic drugs. The activity was conducted on different concentration of extract (25mg/ml, 50 mg/ml) and standard drug (25mg/ml, 50 mg/ml,) and observed the time of paralysis and time of death of worms in minutes. Diminishing the endothelium reliant vasodilation and atherosclerosis by inactivation of nitric oxide could be a result of free radical accumulation. The ROS (reactive oxygen species) in customary metabolic pathways is manufactured without interruption. ROS accumulation may increase; due to diet, smoking, environmental variabilities and exercises.

CONCLUSION

Dragon fruit peel powder is the one of the medicinal plant species that gained popularity for a wide range of medicinal application due to its peel powder which are rich in phytoconstituents. Continuous scientific investigation on Dragon fruit peel powder are needed to better understand its many medicinal potentials. From the above results it was concluded and confirmed that ethanolic extract of Dragon fruit peel power is having an anthelmintic activity. The preliminary phytochemical investigation of ethanolic extract of Dragon fruit peel powder showed the presence of flavonoids, which are mostly responsible for anthelmintic activity. It was observed that ethanolic extract have showed the effects on paralysis and death times were concentration dependent; different concentrations of extract 25mg/ml, 50 mg/ml however of extract demonstrated the most substantial anthelminthic activity was compared with the standard drug. Ethanolic extract of Dragon fruit peel powder showed better anthelmintic activity in Comparison to the standard drug.

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